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(54) **TUBE RACK-OUTS FOR USE WITH EXERCISE MACHINE**

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(Continued)

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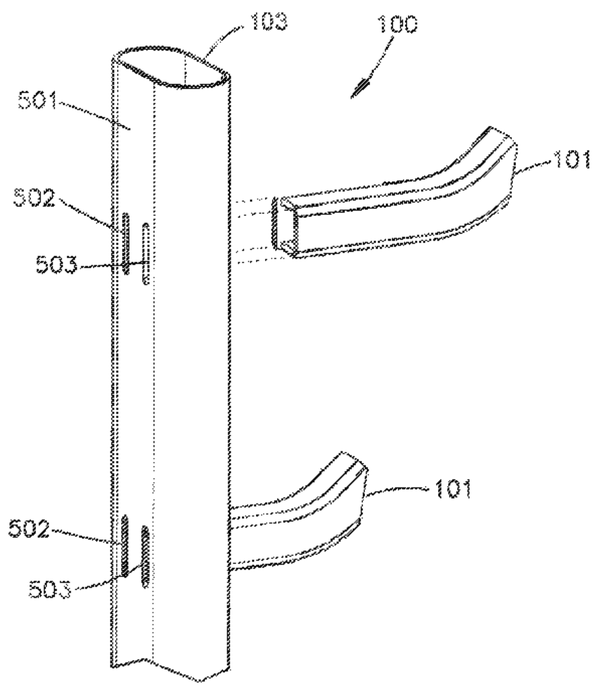
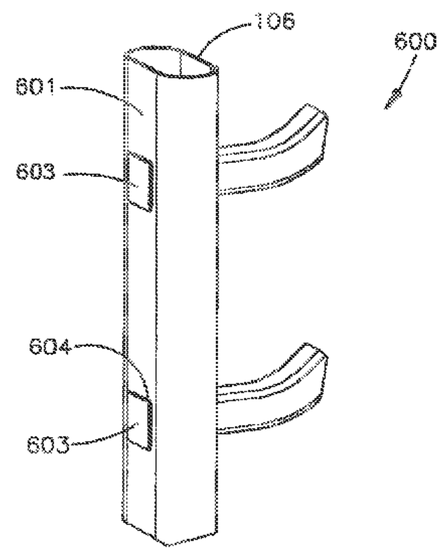
(57) **ABSTRACT**

A tube rack-out system for use in an exercise machine having: a hollow support structure having an aperture therein; an angled tubular member, the angled tubular member having a first end received into the aperture in the hollow support and a second end that is angled upwardly; and a cover passing over an upper surface of the angled tubular member, the cover being connected onto the hollow support structure. The system enables the mounting of individual rack-outs on a support member and provides a large surface area between the covers and the angled tubular member below the covers, thereby contributing to the long life of the covers.

12 Claims, 4 Drawing Sheets





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USPC 482/104, 103; 211/87.01, 106.01, 193, 211/85.7, 192, 191, 190, 100, 101, 196, 211/197, 205; 248/345.1, 452, 453, 248/220.41, 224.8, 225.11, 247, 250

See application file for complete search history.

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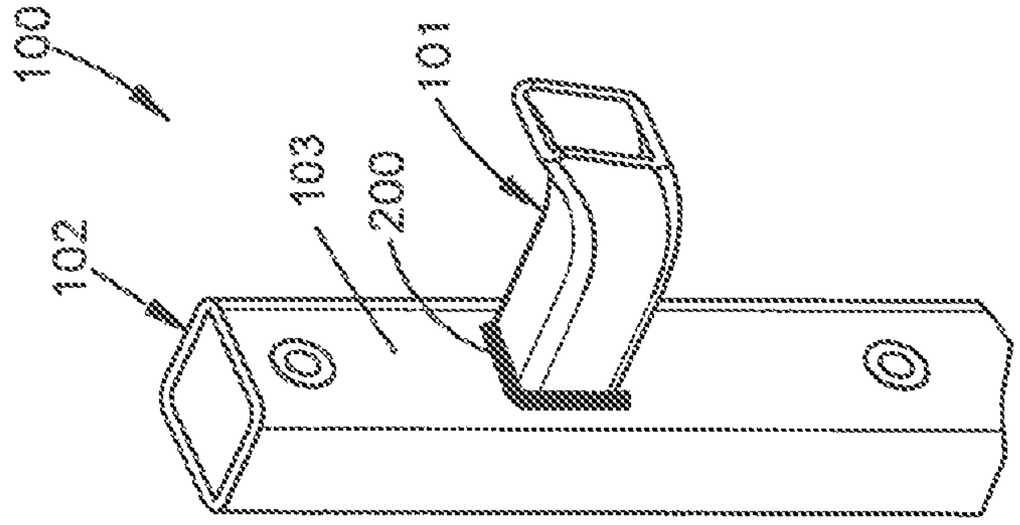

Fig.2

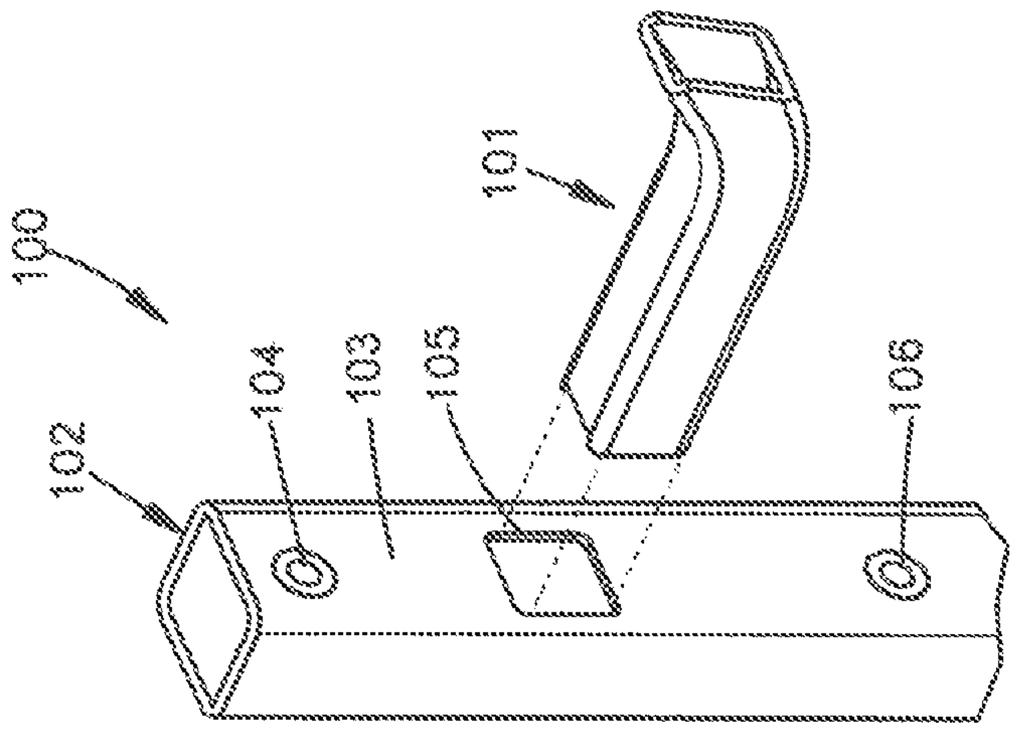

Fig.1

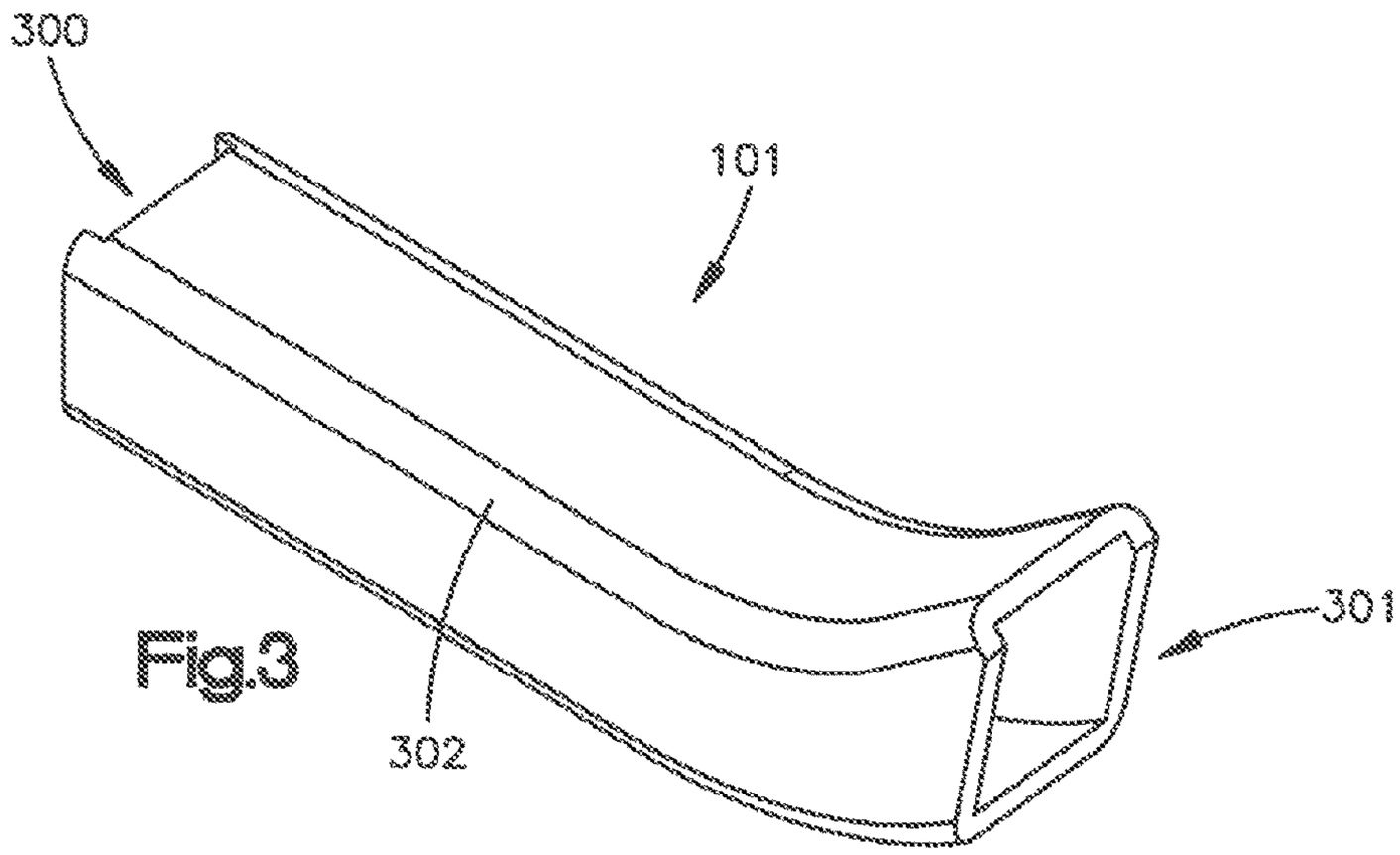

Fig.3

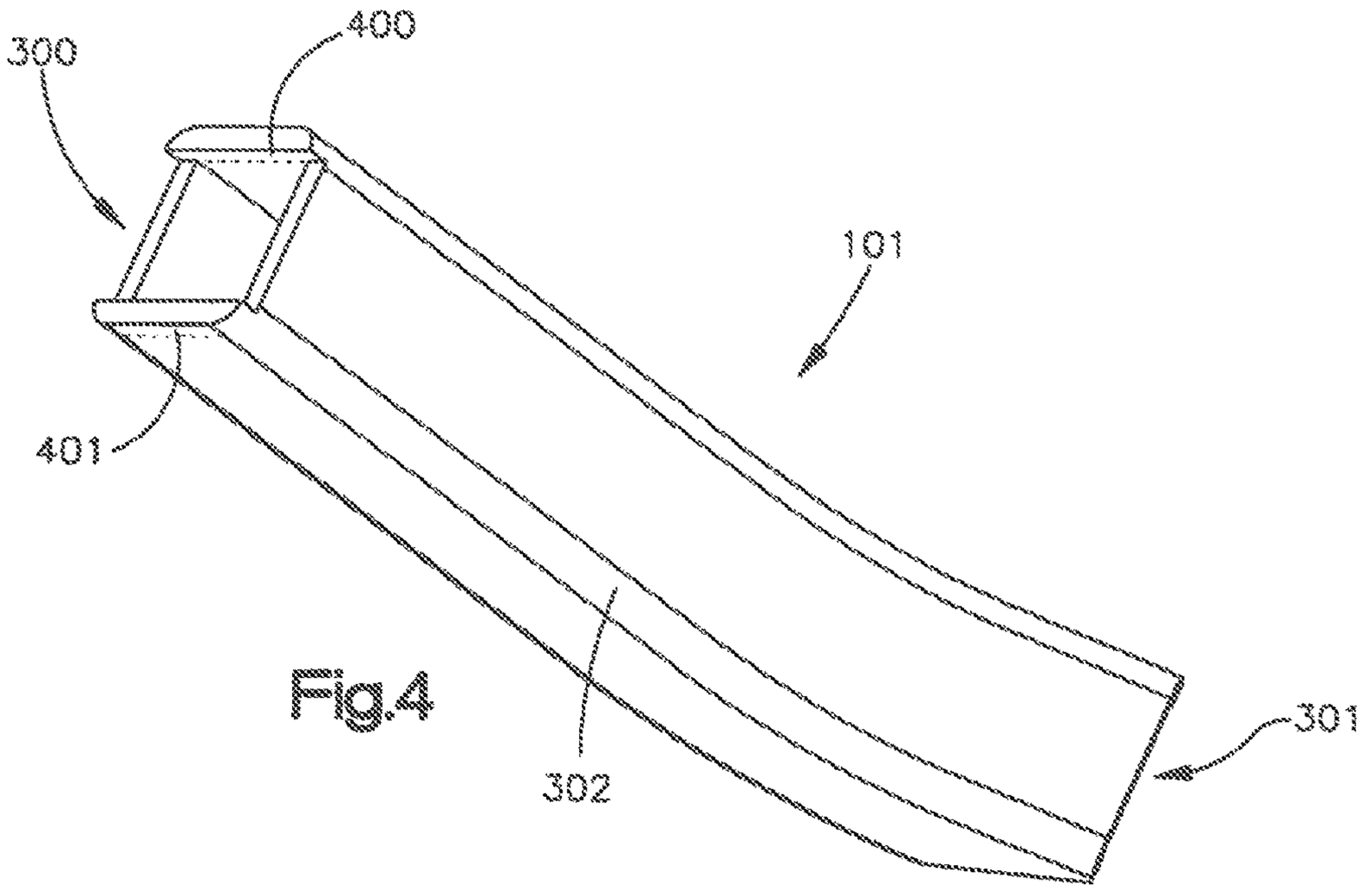

Fig.4

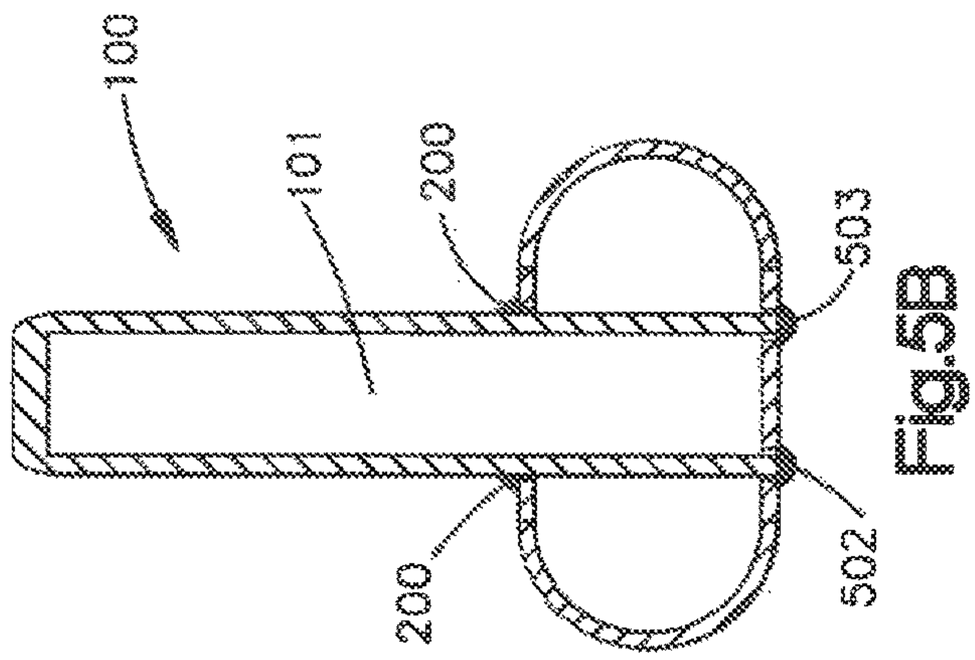

Fig.5B

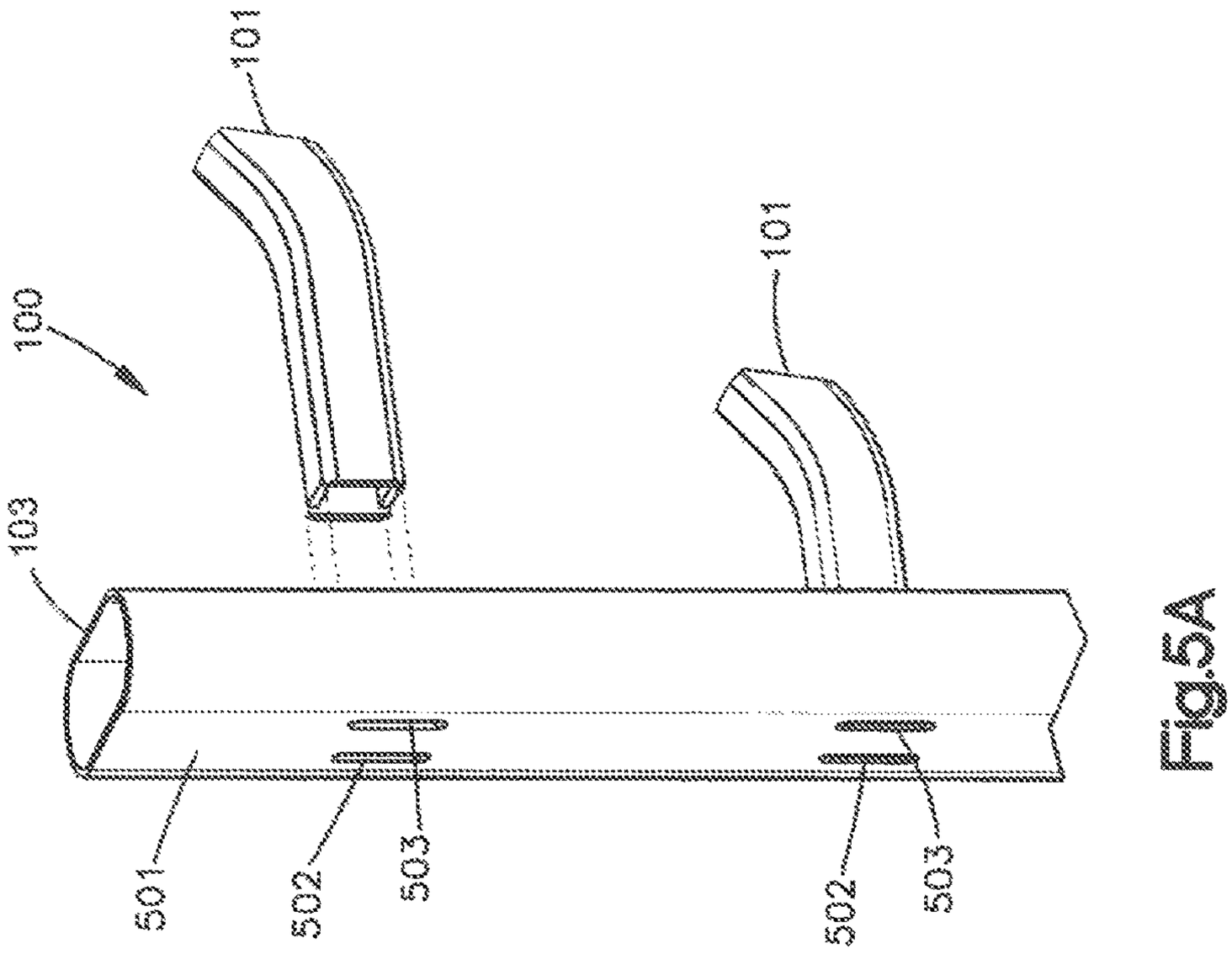

Fig.5A

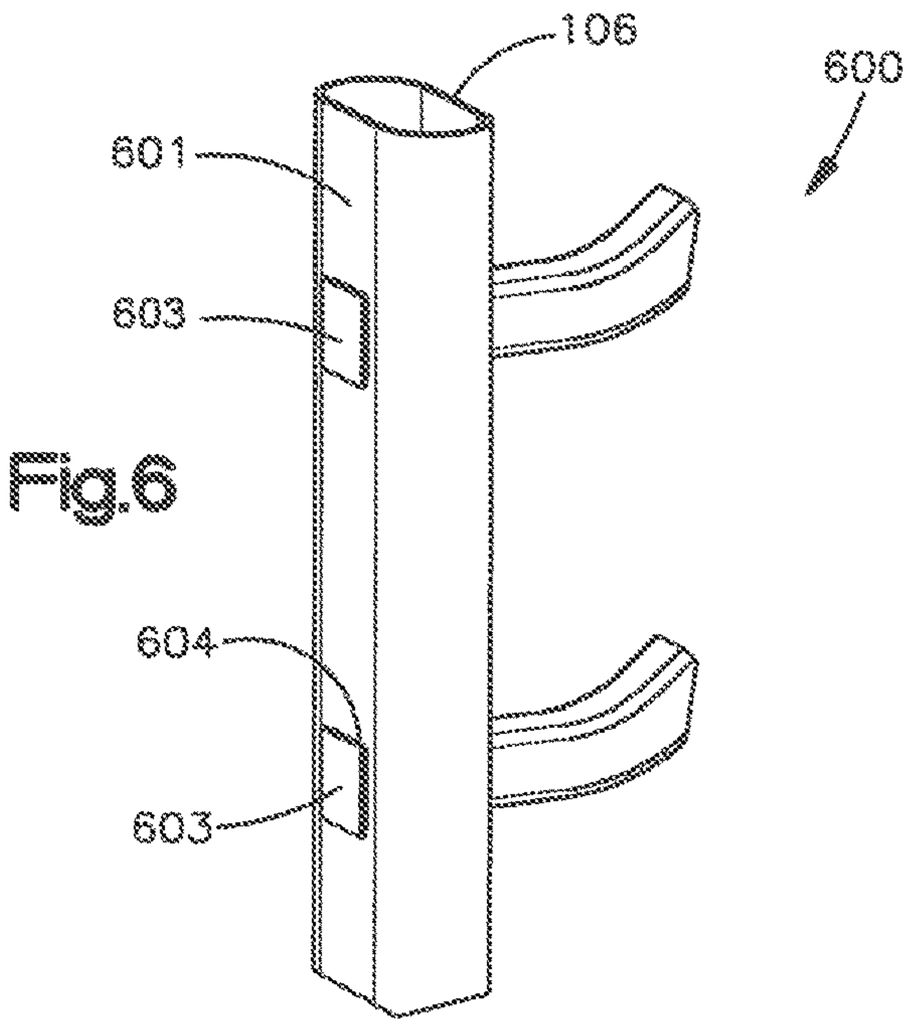

Fig.6

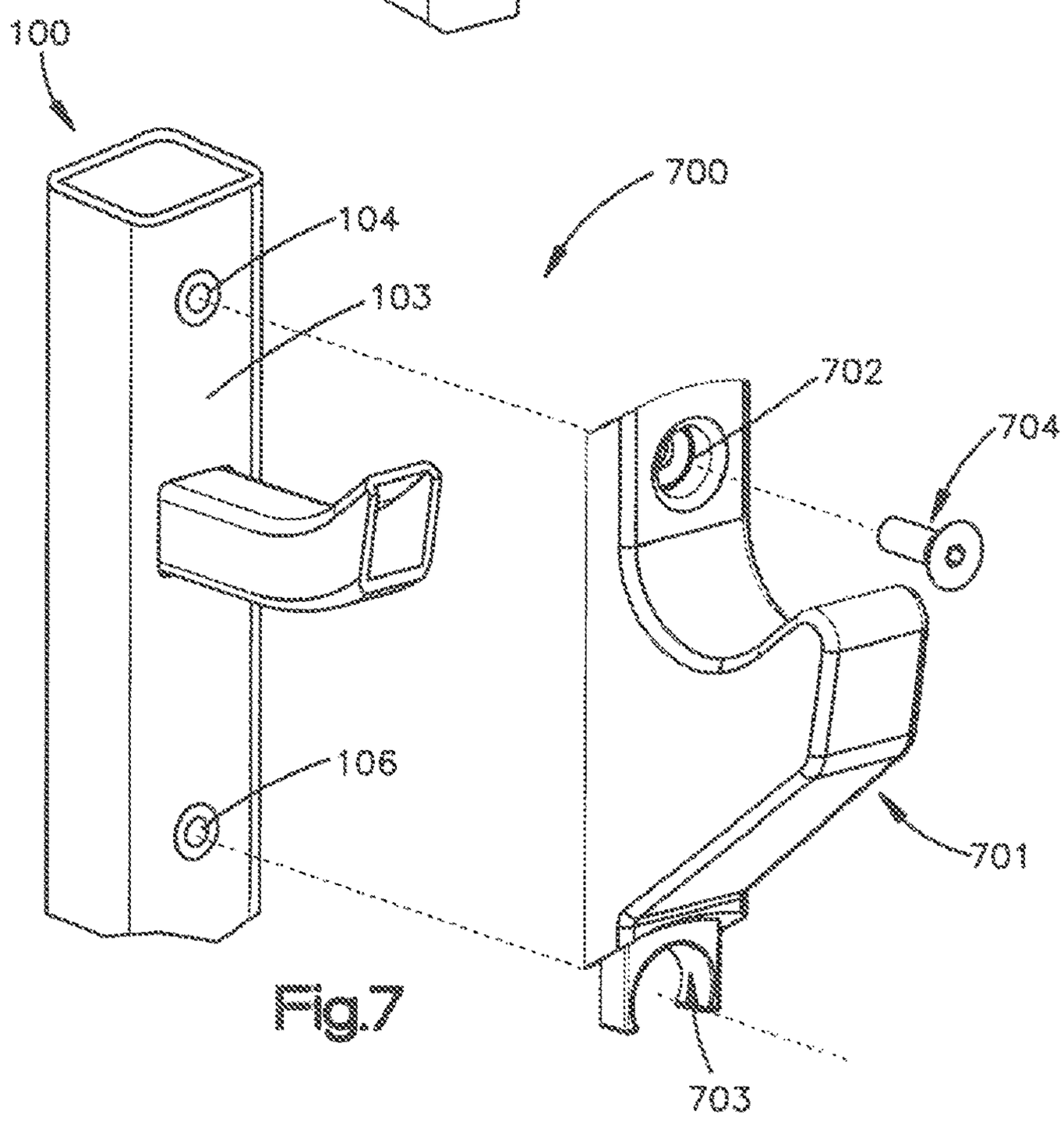

Fig.7

TUBE RACK-OUTS FOR USE WITH EXERCISE MACHINE

RELATED APPLICATION

The present application claims priority to U.S. Provisional Patent Application 62/407,623, of same title, filed Oct. 13, 2016, the full disclosure of which is incorporated by reference herein in its entirety for all purposes.

TECHNICAL FIELD

The present system relates to rack-outs for use with weight-lifting exercise machines or weight-lifting bar storage racks.

BACKGROUND OF THE INVENTION

An exercise machine and/or an exercise storage rack may include rack-outs for holding exercise equipment including free weights and/or assisted exercise bars. For example, rack-outs may be used on exercise storage racks for holding free weight equipment such as dumbbells and/or barbells. The use of rack-outs allow users to keep free weight equipment organized and helps to avoid hazards associated with equipment lying around on the floor. Rack-outs may also be used on exercise machines having assisted exercise equipment where exercise bars are physically attached to the exercise machine. In these configurations, use of rack-outs allow a user to rest an assisted bar on the rack-outs when the user is finished using it.

Whether the rack-outs are used for free weights or assisted weights, the rack-outs are subject to wear due to a high frequency of equipment placed on and off of them. Over time this can lead to damage of the covers that are placed over the rack-outs. There are many types of rack-outs on the market today, and they may use different configurations. However, most of them use polyurethane covers positioned over the edges of a laser cut steel plate. Unfortunately, these steel plates typically have high manufacturing costs as they are too thick to stamp out. In addition, these steel plates can often damage the polyurethane covers over time due to the high frequency of equipment placement upon the minimal edge surface area of the steel plates.

Accordingly, the need exists for a new rack-out design that helps to minimize damage to the polyurethane covers. In addition, the need exists for a cost-effective retail price point to allow integration of the rack-out designs into home and/or light commercial exercise machines.

SUMMARY OF THE INVENTION

In a first aspect, the present system provides a weight exercise rack-out support apparatus, comprising: (a) a hollow support structure having an aperture therein; (b) an angled tubular member, the angled tubular member having a first end received into the aperture in the hollow support and a second free end that is angled upwardly; and (c) a cover passing over an upper surface of the angled tubular member, the cover being connected onto the hollow support structure.

In various embodiments, the rectangular cross sections are square cross sections, the hollow support structure is positioned vertically and the angled tubular member projects horizontally away from the hollow support structure.

In various embodiments, the cover has a downwardly shaped curved portion that is received over the upwardly curved free end of the tubular member. The cover may optionally be secured to the hollow support structure with screws.

In other alternate embodiments, the support structure may have a pair of slots on a side opposite to the aperture and the angled tubular member may have end notches that are received into these slots. Preferably, the angled tubular member is welded into the aperture in the support structure, and/or the end notches on the angled tubular member are welded into the slots in the support structure. In further alternate embodiments, an end cap can be disposed over the second aperture in the hollow support structure such that the end cap covers the open first end of the angled tubular member.

The present rack-out system has numerous advantages. First, the present rack-out system adds to the lifetime of an exercise machine and/or exercise equipment storage rack by providing a wide contact area between the cover and the solid top surface of the angled tubular member supporting the cover. This wide contact area helps to prevent tears to the polyurethane covers. Secondly, the present system is more cost effective for home and/or light commercial exercise machines and/or exercise equipment storage racks. This is due to the fact that each angled support member and associated rack-out cover and can be separately attached to the vertical support member. In contrast, existing systems typically use large saw-tooth shaped cut out steel panels that stretch along the full height of the rack-out system. The present system completely advantageously avoids such large saw-tooth shaped laser cut out steel panels.

Also, the present system has rounded surface edges that are less likely to tear the covering materials upon impact with the edges. In addition, the present system offers the benefits of easier and cheaper manufacturing. For example, an angled tubular member as described herein is much easier to bend and cut as compared to a conventional cut-out steel panel rack-out configuration. In a conventional rack-out configuration, the rack-outs are usually formed thick plates that may be 0.5 inches thick and must be laser cut as they are too thick to stamp out. In the above examples, the tubes are cheaper, easier to manufacture, better for maintaining covers, and may be used with home exercise equipment, and larger or smaller commercial equipment.

This Summary is provided to introduce a selection of concepts in a simplified form that are further described below in the Detailed Description. This Summary is not intended to identify key features or essential features of the subject matter, nor is it intended to be used as an aid in determining the scope of the subject matter.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an exploded perspective view of an embodiment of the present tube rack-out system having a square hollow support structure and a square angled tubular member.

FIG. **2** is an assembled perspective view corresponding to FIG. **1** showing a first end of the angled tubular member received into the square aperture in the hollow support structure.

FIG. **3** is a front perspective view of the angled tubular member of FIGS. **1** and **2**.

FIG. **4** is a rear perspective view of the angled tubular member of FIG. **3**.

FIG. **5**A is a rear perspective view of an embodiment of the present tube rack-out system showing a pair of vertical slots on the hollow support structure into which are received a pair of notches on the angled tubular member.

FIG. **5**B is a cross-sectional top view of the embodiment of the present tube rack-out system of FIG. **5**A.

FIG. **6** is a rear perspective view of an embodiment of the present tube rack-out system having end caps over apertures in the back wall of the hollow support structure.

FIG. **7** is an exploded front perspective view of the present tube rack-out system showing a cover passing over the angled tubular member and attached onto the hollow support structure.

Throughout the drawings and the detailed description, unless otherwise described, the same drawing reference numerals will be understood to refer to the same elements, features, and structures. The relative size and depiction of these elements may he exaggerated for clarity, illustration, and convenience.

DETAILED DESCRIPTION OF THE DRAWINGS

The foregoing summary, as well as the following detailed description, will be better understood when read in conjunction with the appended drawings. For the purpose of illustration, certain embodiments of the present invention are shown in the drawings. It should be understood, however, that the invention is not limited to the precise arrangements and embodiments shown. The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate an implementation of systems, apparatuses, and methods consistent with the present description and, together with the description, serve to explain advantages and principles consistent with the invention.

The embodiments of the present invention will now be described more fully with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. The following detailed description is provided to assist the reader in gaining a comprehensive understanding of the methods, apparatuses, and/or systems described herein. This invention may, however, be embodied in many different forms and should not be construed as limited to the illustrated embodiments set forth herein. Accordingly, various changes, modifications, and equivalents of the systems, apparatuses and/or methods described herein will be suggested to or understood by those of ordinary skill in the art. Also, descriptions of well-known functions and constructions may be omitted for increased clarity and conciseness.

In the following description, like reference characters designate like or corresponding parts throughout the figures. It is to be understood that the phraseology and terminology used in the following description are used for the purpose of description and enablement, and should not be regarded as limiting. Additionally, in the following description, it is understood that terms such as "top," "bottom," "side," "front," "back," "inner," "outer." and the like, are words of convenience and are not to be construed as limiting terms.

FIGS. **1** and **2** are perspective views of an embodiment of the present tube rack-out system **100** comprising a support structure **102** and an angled tubular member **101**. Optionally, support structure **102** and angled tubular member **101** are both square in cross-section as illustrated. However, it is to be understood that the present system is not so limited and that other hollow rectangular shapes or non-rectangular shapes may also be used instead.

Support structure **102** may have a first exterior wall **103** which preferably has a first mount hole **104** an aperture **105** and a second mount hole **106**, positioned as shown. FIG. **1** shows an exploded perspective view and FIG. **2** shows an assembled perspective view (in which a first end of angled tubular member **101** is received into aperture **105**). Subsequent to its insertion, angled tubular member **101** may be held in position by welding along first weld line **200**.

FIGS. **3** and **4** show front and rear perspective views of the angled tubular member **101** of FIGS. **1** and **2**. As seen in FIG. **3**, angled tubular member **101** may have a first end **300** and a second (free, angled) end **301**. The first end **300** is preferably straight and may preferably extend horizontally, or perpendicular to, support structure **102**. The second end **301** may bend or curved upwardly as shown such that second end **301** may be positioned higher from the ground than first end **300**. It is to be understood that the angle of curvature of upwardly curved end **301** need not be exactly as shown. Specifically, the angle of curvature may be more or less than the illustrated embodiment, and the bend may be smooth and curvilinear as shown or may change direction at a more abrupt angle. Preferably as well, angled tubular member **101** may have rounded edges **302** onto which covers (**701** in FIG. **7**) are placed.

In preferred configurations, support structure **102** is positioned vertical to the ground and the first end **300** of angled tubular member **101** will therefore be positioned horizontal to the ground. It is to be understood, however, that the present system is not so limited. For example, support structure **102** may instead be tilted backwardly somewhat such that free end **301** of angled tubular member **101** will be positioned even higher than it would have been positioned above first end **300** if support structure **102** were simply vertical.

As seen in FIG. **4**, angled tubular member **101** may also have vertical notches **400** and **401**. FIG. **5**A shows a pair of vertical slots **502** and **503** on support structure **102** into which vertical notches **400** and **401** can optionally be received. FIG. **5**B is a cross-sectional top view also showing how vertical notches **400** and **401** (FIG. **4**) can be received into vertical slots **502** and **503**, respectively. As also seen in FIGS. **5**A and **5**B, the vertical support member can itself have a non-rectangular cross-section with opposite straight walls **301** and **501** with curved side walls therebetween. As can also be seen, subsequent to the insertion of vertical notches **400** and **401** into vertical slots **502** and **503**, the first end **300** of angled tubular member **101** will be flush with the exterior of side wall **501**. Optionally, welding may be performed along vertical slots **502** and **503** in order to secure angled tubular member **101** into support structure **102**.

FIG. **6** is a rear perspective view of an alternate embodiment of the present tube rack-out system **600** having end caps **603** positioned over the apertures in the back wall **601** of the hollow support structure **106**. Specifically, hollow support structure **106** may have a second aperture (not shown, found immediately behind end cap **603**). In this configuration, first end **301** of angled tubular member **101** may be inserted into aperture **105** and project out of the second aperture on hollow support structure **106**. Next, end cap **603** may be inserted into the open tubular end of first end **301** of angled tubular member **101**, or end cap **603** may simply cover the open tubular end of first end **301** of angled tubular member **101**. Optionally, end cap **603** may be welded into position along weld line **604**. In other embodiments, end cap **603** may simply be a plastic insertion piece.

FIG. **7** is an exploded front perspective view of the present tube rack-out system **700** showing a cover **701** passing over the angled tubular member **101** and attached onto the hollow support structure **106**. Cover **701** optionally has a first cover mount hole **702** and a semicircular cover mount hole **703**. Cover **701** passes over the upper surface of the angled tubular member **101**, and cover **701** is connected directly onto the hollow support structure **106**. As can be

seen, cover **701** preferably has a downwardly shaped curved portion that is received over the upwardly curved free end of angled tubular member **101**. As such, when a weight bar (e.g.: barbell or a dumbbell) is placed on top of cover **701**, the weight bar is fully supported by the upper surface of angled tubular member **101** immediately below cover **701**. Optionally, cover **701** can be made of polyurethane, or other suitable material.

The first cover mount hole **702** may preferably align with the first mount hole **104** of the first exterior wall **103** of support structure **102**. Securing mechanism **704** may be inserted through first cover mount hole **702** and first mount hole **104** to secure rack-out cover **701** to the first exterior wall **103** of support structure **102**. A second, similar securing mechanism (not shown) may also be inserted through semi-circle cover mount hole **703** and second mount hole **106** to further secure rack-out cover **701** to the first exterior wall **103** of support structure **102**.

In various exemplary embodiments, the cross section of the angled tubular member **101** may be a 1 inch squared cross section. However, the cross sectional shape of angled tubular member **101** is not limited thereto. For example, the cross sectional dimensions may include at least 0.5 square inches, at least 1 square inch, at least 1.5 square inches, at least 2 square inches, at least 2.5 square inches, at least 3 square inches, at most 0.5 square inches, at most 1 square inches, at most 1.5 square inches, at most 2 square inches, at most 2.5 square inches, or at most 3 square inches.

In other examples, members **101** and **106** may each have cross-sections that are rectangular, rather than a square, with sides that have at least a 1.5:1 ratio, at least a 2:1 ratio, at least a 2.5:1 ratio, at least a 3:1 ratio, at least a 3.5:1 ratio, at least a 4:1 ratio, at least a 4.5:1 ratio, at least a 5:1 ratio, at most a 1.5:1 ratio, at most a 2:1 ratio, at most a 2.5:1 ratio, at most a 3:1 ratio, at most a 3.5:1 ratio, at most a 4:1 ratio, at most a 4.5:1 ratio, or at most a 5:1 ratio.

LIST OF REFERENCE NUMERALS

100—rack-out system
101—angled tubular member
102—support structure
103—first exterior wall
104—first mount hole
105—aperture
106—second mount hole
200—first weld line
300—first end of angled tubular member
301—second end of angled tubular member
302—round edge of angled tubular member
400—first vertical notch on angled tubular member
401—second vertical notch on angled tubular member
501—second slotted exterior wall on support structure
502—first vertical slot on support structure
503—second vertical slot on support structure
600—end cap rack-out assembly
601—second exterior wall of support structure
602—second rack hole of support structure
603—end cap
604—second weld line
700—cover mounting assembly
701—rack-out cover
702—first cover mount hole of support structure
703—semicircle cover mount hole of support structure
704—securing mechanism

The list of reference numerals is provided for convenience and is intended to aid understanding of the illustrated examples described above. The examples of the present invention may be described in many different forms and should not be construed as limited to the illustrated examples. Likewise, the list above setting forth the reference numerals and associated components comprising the illustrated examples do not limit the scope of the invention.

One of skill in the art will recognize that the examples described above are not limited to any particular size, and the size of the exercise machine will depend upon the particular application and intended components. It will be appreciated by those skilled in the art that changes could he made to the examples described above without departing from the broad inventive concept thereof. It is understood, therefore, that the invention disclosed herein is not limited to the particular examples disclosed, and is intended to cover modifications within the spirit and scope of the present invention.

What is claimed is:

1. A support apparatus, comprising:
a hollow support structure having an aperture therein;
an angled tubular member, the angled tubular member having a first end received into the aperture in the hollow support and a second end that is angled upwardly; and
a cover passing over an upper surface of the angled tubular member, the cover being connected onto the hollow support structure,
wherein the support structure has a pair of slots on a side opposite to the aperture and the angled tubular member has notches thereon that are received into the slots.

2. The apparatus of claim **1**, wherein the support structure has a rectangular cross section.

3. The apparatus of claim **1**, wherein the support structure is a vertical member.

4. The apparatus of claim **1**, wherein the angled tubular member has a rectangular cross section.

5. The apparatus of claim **4**, wherein the aperture in the support structure is rectangular.

6. The apparatus of claim **1**, wherein the second end of the angled tubular member is an upwardly curved free end.

7. The apparatus of claim **6**, wherein the cover has a downwardly shaped curved portion that is received over the upwardly curved free end of the tubular member.

8. The apparatus of claim **1**, wherein the angled tubular member is welded into the aperture in the support structure.

9. The apparatus of claim **1**, wherein the first end of the angled tubular member is perpendicular to the hollow support.

10. The apparatus of claim **1**, wherein the first end of the angled tubular member is horizontal and the hollow support is vertical.

11. The apparatus of claim **1**, wherein the cover is made of polyurethane.

12. A support apparatus, comprising:
a hollow support structure having an aperture therein;
an angled tubular member, the angled tubular member having a first end received into the aperture in the hollow support and a second end that is angled upwardly;
a cover passing over an upper surface of the angled tubular member, the cover being connected onto the hollow support structure; wherein the hollow support structure has a second aperture opposite the aperture; and

an end cap disposed over the second aperture and connected to the first end of the angled tubular member.

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